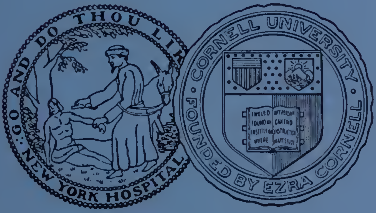
THE TENTH ANNUAL REPORT

of the

DEPARTMENT
of ANESTHESIOLOGY
1967



The New York Hospital - Cornell Medical Center
525 East 68th Street, New York, New York

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THE NEW YORK HOSPITAL - CORNELL MEDICAL CENTER
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THE TENTH ANNUAL REPORT – 1967

of the

DEPARTMENT OF ANESTHESIOLOGY

by Joseph F. Artusio, Jr., M.D.

To the President of the Board of Governors of the Society of The New York Hospital and the President of the Board of Trustees of Cornell University:

On the occasion of the tenth Annual Report of the Department of Anesthesiology, it seems appropriate to look back at the road traversed and to view progress in perspective. Such a reappraisal permits examination of the goals set ten years ago and evaluation of the results in terms of present conditions. In addition, we can outline our future objectives.

Two significant milestones in the progress of this Department were passed, one in 1958 and the other in 1967. In 1958 the section of the Department of Surgery of The New York Hospital assumed the status of an independent major clinical department, and in this year of 1967, the Department of Anesthesiology was established at Cornell University Medical College with autonomus academic status and the chair of this discipline was also established.

The annual report of 1958 recounted the previous ten year period (1948-1958), during which anesthesiology was a section of the Department of Surgery. In 1948, one anesthesiologist was the only physician in the group; by 1958, there were eight attending and ten resident anesthesiologists. A paragraph from the 1958 annual report reads as follows:

> "Up until a few months ago, this department was a division of the Department of Surgery. However, in July it was established as a major department in its own right. This was the culmination of the diligent work of many individuals, but the gradual development and final establishment of this department can be credited to Dr. Frank Glenn whose understanding and constant support and advice gave courage to those of us who were attempting to advance the practice, teaching and research in the relatively young field of anesthesiology." The paragraph continues, "this endeavor was begun 10 years ago but we had travelled only a short distance along the road to academic achievement, however, great strides will be made in the near future."

Many of these same words will be used in this 1967 report. Gradual development and final establishment of this academic Department of Anesthesiology at the Cornell University Medical College can be credited to Dr. Frank Glenn, whose understanding, constant support, and wise advice has given us courage to advance practice teaching and research in our area of medicine. It was true, as pointed out in the 1958 report, that we had travelled only a short distance along the road of academic achievement. Our clinical autonomy had been recognized, but our academic independence was still to be earned. It was obvious that we would have to make great strides to reach this goal.

During the years 1958 and 1959, the enlarging staff made the need for additional space critical. However, where to start this expansion was the subject of many staff discussions. The consensus was to develop a library-seminar as the first priority. We desperately needed a place to sit and think in a quiet atmosphere with necessary resource material, and an area where we could discuss clinical work, teaching and research.

During 1959, our petition for such a facility was sent to the Board of Governors of the Society of The New York Hospital, and following their approval the 1960 report announced that we now had a complete anesthesiology departmental library, comprising 340 square feet of floor space on the 11th floor of the main hospital. Bookshelves of cherry-stained hard wood lined the walls; two large seminar tables and 15 seminar chairs provided comfort and convenience. We began with 336 books and 150 bound journals which we had previously stored in makeshift bookcases throughout the Department. It was the most up-to-date library in anesthesiology in any department in the country. The library area was considered large enough to meet the needs of our expansion for the foreseeable future.

In 1962, it became obvious that the space the Department of Surgery had set aside for us in their research laboratory was inadequate. We were therefore given space for the first separate department of anesthesiology laboratory and it was equipped with the most advanced instrumentation. By 1965, plans for the new William Hale Harkness Research Building were well underway, and the Department of Anesthesiology was given 3,000 square feet of floor space in it. We would now be able to enlarge our research facility from one single laboratory to a group of four to five well equipped, spacious laboratories.

In 1958, we were teaching in the Department of Anatomy, the Department of Pharmacology and the Department of Surgery. By 1959, we were revising our teaching methods, abandoning the didactic lecture for the seminar type of instruction. Students were given formal notes and a bibliography well in advance of the seminars. They came prepared; the material was covered by discussion and question and answers. This form of training proved very effective and is still being used. By 1958, we were conducting an active elective in anesthesiology, available to fourth-year students. These elective periods were either one or two months in duration and designed not only for those students who would be interested in anesthesiology as a medical specialty, but also for those who planned to enter general practice, medicine, or surgery, as it would provide him with an excellent background in inhalation therapy, resuscitation and the care of the unconscious patient. It was obvious by 1959 that we were enthusiastic about our seminar type of teaching.

During 1962, our teaching notes, prepared by Dr. Valentino D. B. Mazzia, (now professor and chairman, of the Department of Anesthesiology at New York University Medical School) and by me, had developed into a text for medical students, published as Practical Anesthesiology, a Text for Use in Medical Student Training.

We increased our efforts in 1963, to see that each medical student had some association with this Department. The manpower shortage in anesthesiology was beginning to develop, and it was important for us as teachers in a large medical center to make the students aware of this particular specialty practice. In 1964, the American Society of Anesthesiologists established a summer fellowship for medical students, and with funds from The New York Hospital and the American Society of Anesthesiologists we began to take our first summer preceptors. This endeavor has been highly rewarding, as shown by follow-up interviews with our summer students. They have all felt that their summers were highly rewarding and that they had developed increased knowledge and insight into the specialty of anesthesiology. They agreed that their newly earned skills would be useful for the rest of their medical careers.

In 1958, there were 10 postdoctoral students in anesthesiology; five years later there were 18 doctors in the program in anesthesiology, and in 1967, 20 postdoctoral students were undergoing training in this specialty.

In 1958, 25 Nurse Anesthetists assisted us in providing the clinical service for this institution. Because of the rise in number of physicians, senior staff members and residents in training, the number has gradually dwindled to nine. These specially trained nurses have made an important contribution to anesthesia in this institution. The ever increasing need for anesthesia in surgery, obstetrics and diagnostic procedures in many clinics of the hospital makes the work of this group vital and imperative. Without them, postgraduate training of physicians in this specialty, so uniquely developed in this institution, would have been extremely difficult to accomplish.

I view the development of the senior staff with pride. In 1958, I had eight associates in the administration of this Department; five years later, the number of senior staff had grown to sixteen. In the year 1967, 21 attending anesthesiologists associated with me are in this Department.

In 1958, we began to have representation on the various hospital committees. Dr. Benjamin E. Marbury, my close associate in this Department since 1949, was developing a section for patients undergoing gynecological and obstetrical operations, Dr. Mazzia was supervising the clinical anesthesia in the main hospital, Dr. Marjorie Topkins was directing our fine staff of Nurse Anesthetists, Dr. Alan Van Poznak was starting to develop the research laboratory, and Dr. Robert Schrier was revising the statistical section of the Deparment using IBM data retrieval methods. All our anesthetic records were put on IBM cards in that year, and each year since, this system has provided a method for retrieving all our statistics for each annual report.

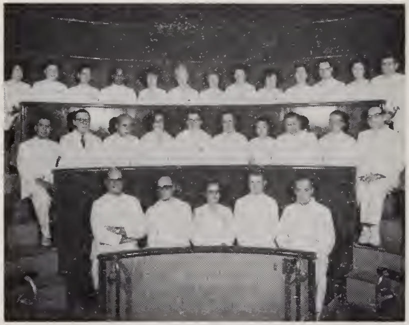
In 1962, not only had our senior anesthesiologists grown in number and distinction, but by this year our former residents and associates had gone on to head their own departments of Anesthesiology in this and in foreign countries. Dr. Alan Van Poznak temporarily left the senior staff to spend two years in the Department of Pharmacology in research under the direction of Dr. Walter Riker. Upon his return, he initiated the ever increasing activities of our anesthesia research laboratory. As the staff increased in size and reputation, they began to travel around the world instructing other physicians in advances made in anesthesiology. In 1961, we were presenting papers and lectures in Texas, California, Colorado, Utah, Michigan, Missouri, New Hampshire, New York, Wisconsin, Oklahoma, Puerto Rico, Canada, Venezuela and Columbia.

The resident training program over the last ten years has changed in content but not in concept. The determination of the order and the pace of the graduate student learning has been extremely important. The residents receive an opportunity for broad base type of education to meet the present practice of anesthesiology and a solid background to cope with future developments.

The activity in research prior to 1958 was primarily clinical in nature. This Department helped in the practical establishment of the electroencephalogram as a tool to measure the depth of surgical anesthesia. We developed one of the first servo-mechanisms to control ether and cyclopropane anesthesia. We explored the first stage of anesthesia, and "ether analgesia" became a practical technique for anesthetizing the poor risk surgical patient. A major change in direction of our research began when Dr. Alan Van Poznak and I attempted to develop the ideal anesthetic agent and studied the halogenated hydrocarbons and halogenated ethers. This work eventually culminated in 1960 with the development of methoxyflurane (penthrane) a non-flammable, non-explosive halogenated ether. In this year of 1967, methoxyflurane is the second most popular inhalation anesthetic used throughout the world.

The activity of our medical students in the research laboratory under the direction of Dr. Van Poznak has been gratifying. Second, third and fourth year students are working in the anesthesia laboratory. Our tiny laboratory is overcrowded; however, with the completion of the Harkness Building next year, the space for investigation will become adequate and our work more efficient. An ever increasing number of our residents are expressing a desire to spend an extra year in anesthesia research under the direction of Dr. Van Poznak.

This, in general, has been our progress in the last 10 years. This year Cornell University Medical College established this academic department and gave us the right to be numbered among its major departments. We now have the duty and obligation to continue to build toward excellence.



My associates in the administration of this department have been:

Benjamin E. Marbury, M.D., Attending Anesthesiologist	January 1949
Marjorie J. Topkins, M.D., Associate Attending Anesthesiologist	July 1952
Alan Van Poznak, M.D., Associate Attending Anesthesiologist	February 1958
Herbert Erlanger, M.D., Assistant Attending Anesthesiologist	June 1957
George R. Monahan, M.D., Assistant Attending Anesthesiologist	July 1960
Jerold Schwartz, M.D., Assistant Attending Anesthesiologist	October 1961
Ann Huston, M.D., Assistant Attending Anesthesiologist	Jan. 1962 - May 1967
Raymond G. Barile, M.D., Assistant Attending Anesthesiologist	July 1963
Louis J. Maggio, M.D., Assistant Attending Anesthesiologist	July 1963 - Defense Service Roll
Barnett J. Junker, M.D., Assistant Attending Anesthesiologist	October 1963
Alexander Gotta, M.D., Assistant Attending Anesthesiologist	July 1964 - Defense Service Roll
Dragan Borovac, M.D., Assistant Attending Anesthesiologist	July 1964
Peter W. T. Yu, M.D., Assistant Attending Anesthesiologist	July 1964
Aileen Kass, M.D., Assistant Attending Anesthesiologist	July 1965
David Susman, M.D., Assistant Attending Anesthesiologist	July 1965
Leslie Balazs, M.D., Assistant Attending Anesthesiologist	July 1966
Judith Weingram, M.D., Assistant Attending Anesthesiologist	July 1966
Liebert Turner, M.D., Assistant Attending Anesthesiologist	October 1966
Gabriel G. Curtis, M.D., Assistant Attending Anesthesiologist	July 1967

During 1967, twenty-one attending anesthesiologists assisted me in providing the anesthesia service for this institution. Again this year, there was an increase in attending anesthesiologists, thus making the attending staff the largest in the history of the Department. During this year, Dr. Ann Huston resigned as an Assistant Attending Anesthesiologist to begin a residency in psychiatry at the Institute for Living in Hartford, Connecticut.

The resident staff appointments in anesthesiology for the year 1967 are as follows:

ANESTHESIOLOGIST (2)

Antonio A. Garcia, M. D.	July 1, 1967
Yung Jai Sohn, M.D.	July 1, 1965

ANESTHESIOLOGIST (1)

George Allgair, M.D.	July 1, 1965 - June 30, 1967
Janet Allgair, M.D.	July 1, 1965 - June 30, 1967
Alegria Bahia, M.D.	July 1, 1965 - June 30, 1967
Gabriel G. Curtis, M.D.	July 1, 1965 - June 30, 1967
Michel Costes, M.D.	July 1, 1966
Vincent DeRosa, M.D.	July 6, 1967
Bienhard Hou, M.D.	October 1, 1966
Parvin Javadi, M.D.	July 1, 1966
Mohammed Radmanesh, M.D.	January 1, 1966
Sirivan Ratanarat, M.D.	July 1, 1966

ASSISTANT ANESTHESIOLOGIST (1)

Michael J. Brooks, M.D.	July 1, 1967
Ching-Ming Chen, M.D.	July 1, 1967
Paul L. Goldiner, M.D.	July 1, 1967
Gregorio Javin, M.D.	July 1, 1967
Herta Maria Luise Juttner, M.D.	July 1, 1967
Raul Limjuco, M.D.	July 1, 1967
Jack Schocoff, M.D.	July 1, 1967 - October 20, 1967
Marlyn G. Sy, M.D.	July 1, 1967

Twenty postgraduate students were trained in anesthesiology this year. Dr. George Allgair, Dr. Janet Allgair, Dr. Alegria Bahia, Dr. Gabriel Curtis and Dr. Yung Jai Sohn all completed their training during this year. Dr. George Allgair is taking a third year of residency at the Virginia Mason Clinic in Seattle, Washington and Dr. Janet Allgair is an attending anesthesiologist in Seattle, Washington. Dr. Alegria Bahia is taking a third year of residency in the cardiopulmonary laboratory at St. Vincent's Hospital in New York City. Dr. Gabriel Curtis joined our attending staff as an Assistant Attending Anesthesiologist in July of this year. Dr. Yung Jai Sohn is an NIH postdoctoral research fellow in the Department of Pharmacology at this institution.

Ten new postgraduate students arrived for our residency program: Dr. Michael Brooks, from Washington University School of Medicine, St. Louis, Missouri; Dr. Ching-Ming Chen, from Kaohshing Medical College, Taiwan; Dr. Vincent DeRosa, from Hahnemann Medical College in Philadelphia, Penn.; Dr. Antonio Garcia, from the University of Santo Tomas, Philippines; Dr. Paul Goldiner, from New York University School of Medicine in New York City; Dr. Gregorio Javin, from University of Buenos Aires in Argentina; Dr. Herta Maria Luise Juttner, from University of Munich in Germany; Dr. Raul Limjuco, from the University of Santo Thomas, Philippines; Dr. Jack Schocoff, from the University of Miami in Coral Gables, Florida and Dr. Marlyn Sy, from the University of Santo Tomas, Philippines.

Dr. Jack Schocoff resigned from the program owing to ill health in October, 1967.

Their training has progressed according to schedule and each postgraduate student has done well.

NURSE ANESTHETISTS

Marjorie J. Topkins, M.D. in charge

Sara Mullin, Senior Nurse Anesthetist	September 1932
Josephine Cahill, Senior Nurse Anesthetist	November 1943 - June 1967
Ethel Kovar, Senior Nurse Anesthetist	November 1944
Grayce Eveleth, Staff Nurse Anesthetist	November 1935
Elizabeth Davis, Staff Nurse Anesthetist	February 1958
Maureen Maxfield, Staff Nurse Anesthetist	February 1958
Carole White, Staff Nurse Anesthetist	March 1963
Georgette Gabriel, Staff Nurse Anesthetist	August 1964
Mary Kucewicz, Staff Nurse Anesthetist	March 1965
Anita Amunategui, Staff Nurse Anesthetist	June 1966 - February 1967
Blanche Lewis, Staff Nurse Anesthetist	August 1966
Ki sook Kim, Staff Nurse Anesthetist	April 1967
Edward Washington, Staff Nurse Anesthetist	May 1967 - September 1967
Barbara Frisch, Staff Nurse Anesthetist	October 1967

In 1958, when this Department became autonomus within the hospital organization, nineteen nurse anesthetists worked with us. Ten years later, at the close of 1967, we had nine nurse anesthetists. This change reflects inversely the increase in numbers of both resident staff and the attending staff, but particularly the latter. The function of the nurse anesthetists has not changed, only the number of nurse anesthetists needed to fulfill this function.

Following World War II, with the great influx of physicians into the field of anesthesiology, the physician anesthetist looked forward to the elimination of nurses in the field. To this end many physicians refused to cooperate in training nurses. This did not take into account the increasing number of hospital beds required for this country, nor the limited number of physicians available to enter the field of anesthesiology.

By 1964, the physician manpower shortage became apparent throughout this country, and a reappraisal of these attitudes became necessary. From this time, a new spirit of cooperation developed between the American Association of Nurse Anesthetists, the governing agency responsible for the establishment and maintenance of standards in schools for nurse anesthetists, and the American Society of Anesthesiologists.

In June, 1967, Mrs. Josephine Cahill retired after almost 24 years of dedicated service in the Department of Anesthesiology at The New York Hospital. She performed her duties well and she will be missed by all of us who knew her for so many years as an associate.

CLINICAL FUNCTIONS OF THE DEPARTMENT

Benjamin E. Marbury, M.D. in charge

The clinical anesthesia during the past 10 years has changed at the New York Hospital. These changes have been qualitative rather than quantitative, as the number of anesthetics administered has remained relatively constant. The total number of anesthetics has not varied more than 3-4% and has always remained in the vicinity of 20,000. The 3-4% variation is primarily related to an increase or decrease in the number of obstetrical deliveries.

During the past 10 years the number of patients requiring anesthesia for diagnostic procedures outside the operating room has increased markedly. There are now a variety of outpatient clinics and diagnostic areas, particularly in radiology, where patients require anesthesia. These requests for anesthesia have become so numerous that they must be arranged beforehand to insure an efficient operation with minimum inconvenience for the patient. A new anesthesia service is provided for the dental out-patient clinic, where simple dental procedures may be accomplished using general anesthesia and the patient after recovery from anesthesia is permitted to go home accompanied by a responsible adult.

A new study was inaugurated this year investigating both general and epidural or caudal anesthesia for the parturient patient in labor. This study should improve anesthetic management of the obstetrical patient.

During the latter part of the year of 1967, with an increase in the number of open-heart and cardiac procedures, the care of post-operative heart patients and assistance with their ventilatory care increased the need of the anesthesiologist in the constant care unit and the recovery rooms. With a wider variety and age range of patients, the clinical experience has been broadened to care for patients for several post-operative days, and this provides an increasing experience for the attending and resident staff.

During the past ten years the practice of surgery has changed, necessitating a change in anesthetic techniques and management. Formerly the explosive agents, cyclopropane and di-ethyl ether, accounted for 60% of all anesthetics administered. Associated with an increase in the use of endothermia and monitoring equipment that are explosive hazards, non-explosive techniques employing nitrous-oxide-pentothal-curare or regional and spinal anesthesia were used in a limited number of cases.

In order to provide a non-explosive inhalation technique, Dr. Raventos in England developed halothane, and Drs. Artusio and Van Poznak at this institution introduced methoxyflurane, both halogenated this ten-year period, the use of methoxyflurane and halothane has agents that have proved invaluable for use in a hazardous area. During increased in our Department so that these agents now account for 80% of all anesthetics administered.

With a change in anesthetic agents over the ten-year period, the use of drugs which block the neuro-muscular junction has also changed. Formerly the use of relaxants was restricted primarily to d-tubocurarine with a limited use of succinylcholine. Not only has the use of relaxants increased, but the use of succinylcholine accounts for 97% of all relaxants and curare for only 3%.

In relation to both equipment and techniques; the past ten years have brought many changes. The most noticeable change is related to anesthesia for infants and children. Where formerly these anesthetics were accomplished primarily with a non-rebreathing T-tube or valve, today an adequate infant circle anesthesia system is available. Almost all children receive anesthesia via a closed circle anesthesia system.

Sophisticated monitoring systems have become commonplace; three or four physiological systems may be monitored on selected patients anesthetized in the operating room. Most of these monitoring devices are electronic. Monitoring of body temperature is routine in children. Automatic devices are used to cool in the presence of fever and to warm if anesthesia and surgery cause the body temperature to fall.

The EKG and intra-arterial blood pressure are frequently monitored during the anesthesia and surgery not only in the operating room but also transferred with the patient to the recovery room and to the intensive care areas. These electronic devices have improved the management of the anesthetized patient. Monitoring temperature, EKG, and blood pressures has made for safer anesthesia in all patients, especially children.

POST-GRADUATE AND UNDERGRADUATE TEACHING

DAVID SUSMAN, M.D. in charge

POST-GRADUATE TRAINING

Over the past 10 years, forty-four residents have completed our anesthesia residency. The Program combines didactic material covered daily in seminar under the direction of an attending anesthesiologist with clinical instruction graduated from simple to more complicated techniques.

During the first four weeks, the first-year residents do not administer anesthesia. Their time is spent with a different attending anesthesiologist each morning, and each anesthesiologist discusses various topics with each resident. Airway maintenance, management of cardiac arrest, fluid and electrolyte therapy and blood replacement are discussed. The remainder of the day is spent in the anesthesia library preparing assignments on physiology, anatomy, pharmacology, and biochemistry as they relate to anesthesiology for the daily seminars, which are conducted by an attending anesthesiologist. Only after the resident has become familiar with the didactic material is he allowed to administer an anesthetic. Ether is the first agent that he uses. It is administered at first by the open-drop method. His only other armamentarium is an oropharyngeal airway, adequate suction and oxygen. All relaxation is accomplished with this agent and technique. After open-drop di-ethyl ether has been mastered, the resident progresses to using the anesthesia machine, employing nitrous-oxide and oxygen as an inducing agent prior to the introduction of ether. Each new agent is introduced in this same manner, with emphasis on simplicity and complete understanding of its pharmacology. Cyclopropane, Pentothal, the muscle relaxants, halogenated agents and endotracheal intubation are used by the end of the first six months. In the last several years, regional techniques have been taught at this juncture in the program so the resident will have a more versatile approach to the obstetrical and emergency patient with a full stomach.

Beginning in July of this year, to ensure exposure to diverse clinical situations, the residents rotate to Memorial Hospital for three months in their first year and spend six weeks at The Hospital for Special Surgery in their second year. These rotations provide extensive training in regional techniques and management of intensive care units as well as exposure to a large number of attending anesthesiologists with a wide and varied background.

The second-year resident participates with the attending anesthesiologists in the supervision and training of the first year group. Their clinical load consists of clinical anesthesia for the surgical specialties, open-heart operations, and pediatric cases.

At present three residents have chosen to remain for a third year of training in pharmacology research, or for intense work in the sub-specialties of anesthesia.

The residency program has now expanded and consists of seven first-year, ten second-year and four third-year residents. All our residents are encouraged to elect three years of anesthesia training.

UNDER-GRADUATE TRAINING

Cornell Medical Students have been taught in the second, third and fourth years. During the second year, Dr. Van Poznak conducts lectures and demonstrations in conjunction with the Pharmacology Department. The third-year students receive eleven, three-hour sessions, consisting of two hours of lectures and an hour of demonstration or operating room participation. The topics include the pharmacology and physiology of the gases and local anesthetics, uptake distribution, fluid and electrolyte balance, mechanical ventilation and resuscitation. The fourth-year instruction is now being incorporated into the third-year program, owing to reorganization of the Medical College curriculum. Starting in 1968, the entire fourth-year program will be available for electives. Our Department will be actively seeking these students for a four or eight week elective in clinical and or research anesthesia. We hope that in the future all medical students will rotate through the Department and, with the assistance of an attending anesthesiologist, participate in the clinical management of patients.

In the clinical fourth-year elective program, the student will be assigned to an attending anesthesiologist, with whom he will make pre-operative visits, administer anesthesia, and provide post-operative and recovery room care. Emphasis will be placed on respiratory physiology, therapy and resuscitation. Progressive participation and responsibility will be given to the student. The laboratory research program will be under the direction of Dr. Alan Van Poznak. The student will receive experience in developing research methods and will study the events at the nerve terminal in the cat, showing the effect of various anesthetic agents on the model, using an electronic recording of a single nerve fiber. Other research projects may also be undertaken with the approval and participation of the Department.

Preceptorship Program

Our preceptorship program for students between their second and third years is now entering its third year. Originated by The American Society of Anesthesiologists and supported by Cornell University Medical College, four students who have completed their second medical school year, spend eight weeks with the Department each summer. The program's goals are to create an interest in anesthesia and to teach acute medicine, care of the unconscious patient, management of airways and resuscitation. The increase in yearly applications by the students is a good indication of the success of this program. The preceptors have found the program very enjoyable and have all benefited from the clinical training.

RESEARCH

Alan Van Poznak, M.D., in charge

During 1967, we continued our work on the motor nerve terminal preparation. Five chemically different inhalation anesthetics were compared; all were found to produce depression of the presynaptic element at concentrations within the clinical dose range. From this we have derived even stronger suggestion that this correspondence is more than coincidental, and we postulate that inhalation anesthetics work centrally in a manner similar to their peripheral action. This is not to suggest that the mechanism of anesthesia has been elucidated; however, it has become clear that certain nerve terminations, previously believed to be but passive transmitters and receivers of neuronal information, are in fact exquisitely sensitive to the effects of depressant drugs, actively modifying information passed on to the next cell. Moreover, it has become clear that anesthetics, although given for effects supposedly limited to the central nervous system, have in addition marked effects on certain peripheral nerve terminations.

We plan to pursue these investigations with preparations involving the central nervous system. If the postulated similarities do in fact exist, then we will have validated the peripheral model as an acceptable system with which to monitor the effects of certain types of nerve depressants. We have been aided in this work by Mr. Dalton Chiscolm, whose meticulous preparations have clearly revealed the information described above.

We have continued our research on teflurane. Were it not for its capacity to produce severe arrhythmias, this non-flammable, rapid-acting gas would be close to the ideal anesthetic agent. In an attempt to control the arrhythmias, we have investigated the effects of several compounds. There is no doubt that propranolol can restore a normal sinus rhythm in cats or human beings anesthetized with teflurane, but the physiological price of beta-adrenergic blockade is higher than many anesthesiologists are willing to pay. Certain other anti-arrhythmic agents were also investigated, and from this work a new phase of research has developed.

It has long been known in clinical practice that the addition of a small amount of di-ethyl ether would reduce or abolish the arrhythmias seen during a cyclopropane anesthesia. Two reasons have been given for this. One is that the addition of ether allows the reduction of cyclopropane concentration. Although clinical depth of anesthesia remains the same, the arrhythmia stimulus has been reduced. The other reason is that the improvement in ventilation produced by the addition of ether lowers the PCO_2 and thereby lessens the tendency to arrhythmias. In order to control these factors, cats were hyperventilated on known concentrations of CO_2. Cyclopropane was added to produce arrhythmia at each CO_2 concentration. An inverse straighline dose response relationship was established. When ether 4% and 8% was added the cyclopropane, CO_2 curves were shifted to the right, indicating an anti-arrhythmic effect of di-ethyl ether which was independent of CO_2 or cyclopropane concentrations.

The above work was done by Richard Wilson, one of our medical students. It has been most gratifying to work with him and with the other students who have elected to spend part of their pharmacology time in our laboratory. It is our hope that when the new laboratory space becomes available, we will be able to have an active teaching and research program at the predoctoral and postdoctoral levels. We plan also to continue the active relationship with the Department of Pharmacology, whose chairman, Dr. Walter F. Riker, Jr., has been instrumental in setting up our present research project on the motor nerve terminal.

RECORDS AND STATISTICS

CHART NO. I — The total number of anesthesias given by this department during 1967 was 19,183. This is an increase of 358 from 1966. Although 600 more general anesthetics were given, there was a decrease in the number of local anesthetics used and there has been a gradual fall in the number of anesthetics administered for the obstetrical patient and for gynecological procedures. General surgery has remained quite stable other than a temporary dip during 1966. The number of non-explosive anesthetic agents used has increased and is now more than 66% of the total anesthetics given.

Chart No. II — Anesthetic methods and techniques have been quite constant during the last two years. The notable exceptions are that di-vinyl ether has almost been abandoned as an induction technique, and that there has been a substantial decrease in the non-rebreathing technique using the valve and the T-tube. The majority of the children's anesthetics in this department have been done using the infant circle technique.

Chart No. III — The only significant change has been the number of intrathoracic procedures, which has risen again this year. The anesthesia for surgery of the heart has been the cause of this increase.

Chart No. IV — The number of cases done by the anesthesiology residents has increased by more than 500. The distribution was similar to 1966, indicating that there was a well-balanced number of cases in all types of surgical procedures.

Chart No. V(a) — There were the same number of cardiac arrests in 1967 as compared to 1966. Of the six patients who incurred cardiac arrest, other than the patients *in extremis* and those for cardiac surgery, four succumbed and two were resuscitated without sequelae. Only one case was completely uneventful; while in the recovery room, the patient developed convulsions associated with cardiac arrest and was successfully resuscitated without sequelae. The two infants, both 8 months of age most probably died because of errors in judgement; blood loss in one and in the other prolonged surgery of more than six hours duration.

Chart No. V(b) — Myocardial Infarctions. There was an increase in the number of myocardial infarctions following anesthesia and surgery; 18 in 1966 and 24 this year. All patients were above the age of 54 and 19 of the 24 were over age 65. Only five patients of the 24 had no history of previous cardiovascular disease. Fifty percent of the patients had had a previous myocardial infarction or had a history of angina.

Chart No. V(c) — There was a slight decrease in the pulmonary complications during 1967. Only one pneumonia occurred in a child below the age of ten years and 1800 anesthetics were administered to this age group. Only one death occurred associated with pneumonia, in this patient there was also an overwhelming peritonitis. It is interesting that 33% of the pneumonias occurred following cholecystectomy. Only two patients with cholecystitis were below the age of 52 years; those individuals were both 30 years of age.

1967

Department of Anesthesiology

General Surgery — GYN — Obstetrics

Fluothane	5,334	
Cyclopropane	3,846	
Methoxyflurane	3,135	
Nitrous Oxide	2,596	
Ether, semi-closed circle	401	
Spinal, single shot	132	
Ether, open	80	
Epidural and caudal	43	
Regional block for surgery	33	
Thiopental sodium, intravenous	19	
Teflurane	16	15,635

General anesthesia for therapeutic procedures:

Thiopental sodium, electroshock	110	
Thiopental sodium, electroconversion	69	179
		15,814

Miscellaneous

Locals, O.R. for surgery	2,959	
Locals, clinic	391	
Blocks, O.R. and Clinic (therapeutic and diagnostic)	19	3,369
		19,183

Private patients	11,828	
Pavilion patients	7,355	19,183

CHART I — Annual Summary — Primary Anesthetics

1967

Department of Anesthesiology

General Surgery — GYN — Obstetrics

Methods of induction to primary anesthesia

Thiopental sodium induction, intravenous	10,295
Brevital inductions	59
Vinethene inductions	2
Thiopental sodium, rectal	1

Induction and maintenance with same anesthetic

Nitrous Oxide induction to Nitrous Oxide maintenance	2,145
Cyclopropane induction to Cyclopropane maintenance	186
Ether induction to Ether maintenance	108

Technics

Closed circle CO_2 absorption	6,910
Semi-closed circle CO_2 absorption	8,015
Infant circle CO_2 absorption	409
Open mask method	84
Mechanical ventilator	17

Special technics

Arfonad (controlled hypotension	45
Cardio-pulmonary bypass (heart & neurosurgery)	83
Generalized hypothermia (tub or blanket)	309
Local hypothermia (ice packs)	14

Endotracheal intubation

Nasoendotracheal	151	
Oroendotracheal	5,975	6,126

Neuromuscular blocking agents

d'Tubocurarine only	104	
Succinylcholine only	6,683	
Both used	698	
Flaxedil only	32	7,517

Chart II — Annual Summary — Methods of Induction — Technics — Special Drugs

1967

ANESTHESIOLOGY DEPARTMENT

Summary of cases

includes General, Spinal and Block Anesthesias

Head and Neck

ENT (by region)	654
Eye	517
Dental	159
Face	172
Thyroid	179
Neck	171
Head, superficial	20
Intracranial	313
Esophagoscopy Bronchoscopy	70
	2,255

Thorax

Great vessels	19
Mitral valvulotomy (closed)	12
Cardiopulmonary bypass	79
Misc. heart surgery	37
Intrapleural	184
Extrapleural	2
Thorax, superficial	512
Thoracic cage	2
Shoulder	28
	875

Upper abdomen

Stomach-duodenum	220
Biliary tract	606
Retroperitoneal	68
Colon	302
Pancreas	17
Spleen	19
Renal	218
Portal	13
Close evisceration	8
	1,471

Lower abdomen

Appendix	220
Bowel, small	113
OB, vaginal delivery	2,937
GYN, abdominal surgery	853
Urology, abdominal	339
Caesarean section	250
Abdominoperineal	49
Abdominal aorta & vessels	136
Ventral hernia	85
	4,982

Abdominal wall

Extraperitoneal	3
Hernia, ing. fem. umbil.	750
Lumbar sympathectomy	15
Abdomen, superficial	58
Burns, 10% of body	5
	831

Perineal

GU perineal (TUR & Cysto)	1,473
Ano-rectal	245
Perineal GYN (D & C, etc.)	2,297
Vaginal hysterectomy	108
	4,123

Spine

Column	131
Cord	47
Back, pilonidal, etc.	61
	239

Limbs

Upper bone	55
Upper soft	208
Lower bone	314
Lower soft	273
	850

Grand total anesthesias	15,635
Grand total operations	15,626

Anesthesia — no operation 9

CHART III

1967

ANESTHESIOLOGY DEPARTMENT

Summary of RESIDENT Anesthesiologists' cases

includes General, Spinal and Block Anesthesias

Head and Neck

ENT (by region)	293
Eye	105
Dental	50
Face	35
Thyroid	63
Neck	70
Head, superficial	10
Intracranial	122
Esophagoscopy Bronchoscopy	28
	776

Thorax

Great vessels	12
Mitral valvulotomy (closed)	10
Cardiopulmonary bypass	78
Misc. heart surgery	23
Intrapleural	70
Thorax, superficial	98
Thoracic cage	1
Shoulder	21
	313

Upper abdomen

Stomach-duodenum	91
Biliary tract	232
Retroperitoneal	26
Colon	92
Pancreas	8
Spleen	10
Renal	97
Portal	5
Close evisceration	4
	565

Lower abdomen

Appendix	90
Bowel, small	30
OB, vaginal delivery	238
GYN, abdominal surgery	275
Urology, abdominal	77
Caesarean section	83
Abdominoperineal	16
Abdominal aorta & vessels	29
Ventral hernia	41
	879

Abdominal wall

Extraperitoneal	2
Hernia, ing. fem. umbil.	252
Lumbar sympathectomy	12
Abdomen, superficial	20
Burns, 10% of body	4
	290

Perineal

GU perineal (TUR & Cysto)	300
Ano-rectal	56
GYN perineal (D & C, etc.)	478
Vaginal hysterectomy	34
	868

Spine

Column	54
Cord	23
Back, pilonidal, etc.	27
	104

Limbs

Upper bone	19
Upper soft	71
Lower bone	140
Lower soft	103
	333

Grand total anesthesias	4,133
Grand total operations	4,128
Anesthesia — no operation	5

Chart IV

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis Operation*	*Anes ind. to arrest*	*Complication*	*Result*
8 mos.	2	Fluothane	S. Closed Endotr.	Anectine	Craniosynostosis Excision sagittal suture	1′ 25″	Cardiac arrest O.R.	Cardiac resus. Death 5th po day
8 mos.	2	Fluothane	S. Closed Endotr.	Anectine	Duplicated rt. upper urinary tract. Status post re-implant rt. with obstruction. Re-implantation double right ureters.	6′ 20″	Cardiac arrest O.R.	Cardiac resus. Death 1st po day
69	2	Penthrane	Closed Endotr.	Anectine	Emphysema & Ca. rt. LLL Right lower lung lobectomy	4′ 45″	Cardiac arrest O.R.	Cardiac resus. success No sequelae
33	2	Cyclo ether	Closed Endotr.	Anectine	Nodular goiter Excision thyroid nodule	2′	Cardiac arrest recovery room	Cardiac resus. success No sequelae
42	1	Penthrane	Closed	— —	Post partum 3 mos ¢ relaxed vaginal outlet. Vaginal hysterectomy, AP repair.	3′	Cardiac arrest recovery room	Cardiac resus. success No sequelae
63	5E	Cyclo	Closed Endotr.	Anectine	Perforated peptic ulcer Subtotal gastric resection, pyloroplasty.	5′ 30″	Cardiac arrest recovery room ?pulm. edema	Cardiac resus. Death R.R.

Chart V(a) — Cardiac arrests and massage within immediate anesthesia period.
(Patients in extremis and those for cardiac surgery excluded)

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis Operation*	*Anes. time*	*Complication*	*Result*
65	3	Cyclo	Closed Endotr.	Anectine	Abd. aortic aneurysm. MI 1961. Gen. arterial insufficiency Resection aortic aneurysm	6′ 10″	Myocardial infarct 7th po day	Death 8th po day
65	3E	Cyclo	Closed Endotr.	Anectine	Acute cholecystitis. Mild cardiac failure. Hx. stroke & MI 1965 Cholecystectomy	3′ 55″	Myocardial infarct during anesthesia	Death O.R.
80	2	Fluothane	S. Closed Endotr.	Anectine	ASCVD.-EKG ST & T wave abnormality. Rt. ing. hernia Rt. ing. hernia repair	2′	Myocardial infarct 1st po day	Death 17th po day
69	3	Cyclo	Closed Endotr.	Anectine	Status MI x 2, 1965, 1966. ASCVD Hypertension past 15 years Cholecystectomy	2′ 10″	Myocardial infarct operative day CVA, operative day	Improved
92	3	Fluothane	S. Closed Endotr.	Anectine	Hypertension BP 195/80. ASCVD Intertrochanteric fracture L. hip Open reduction, Jewett nailing	2′ 5″	Myocardial infarct operative day	Death Recovery Room
70	3-4	Ether Cyclo	Closed	Anectine	Chr. cholecystitis, cholelithiasis choledocholithiasis. Hypertensive ASCVD ¢ atrial fibrillation Cholecystectomy, CD exploration	2′ 25″	Myocardial infarct 2nd po day	Death 2nd po day
62	3	1.Penthrane 2.Pent-N20 3.Pent-N20 Ether.	Closed S. Closed S. Closed Endotr.	Anectine	Gen. ASCVD. Previous MI 1961 & 1964 L. femoral artery occlusion ¢ impending gangrene. Compensated heart failure. 1. L. lumbar sympathectomy 5-24-67 2. L. above knee amputation 7-22-67 3. Hernioplasty 9-10-67	2′ 30″ 1′ 30″ 1′ 40″	Myocardial infarct c cardiac arrest during 1st op. day	Improved
69	2	Penthrane	Closed Endotr.	Anectine Curare	Exogenous obesity. Ventral hernia Repair ventral hernia	3′	Myocardial infarct 1st po day	Death 4th po day
78	2	Cyclo Ether	Closed Endotr.	Anectine	Pernicious anemia. Ca. stomach Radical total gastrectomy	8′ 50″	Myocardial infarct 2nd po day	Improved

Chart V(b) — Vascular complications within 7 day post anesthesia period.

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis* *Operation*	*Anes. time*	*Complication*	*Result*
85	3	Xylocaine Penthrane	Closed	— —	LLL lung infiltrate. CVA 1959 ¢ residual L. hemiparesis. ASCVD Intertrochanteric fract. L. hip. Closed red. Jewett nail fixation.	2′ 8″	Myocardial infarct operative day	Improved
75	3	Ether	S. Closed	Anectine	Small bowel obstruction. ASCVD ¢ angina. Organic brain syndrome. Repair incisional hernia. Decompression enterotomy.	3′ 20″	Myocardial infarct 1st po day	Death 4th po day
73	3	Cyclo ether	Closed Endotr.	Anectine Curare	Atherosclerotic CV disease ¢ Leriche syndrome. Hx MI 1963. Aortico-femoral bypass graft.	5′ 40″	Myocardial infarct operative day	Death operative day
69	3	Penthrane	Closed Endotr.	Anectine Curare	Carcinoma left lung. Ant. MI preop. indeterminate age. Left pneumonectomy	4′ 5″	Myocardial infarct 2nd po day	Death 6th po day
65	4	Penthrane	Closed Endotr.	Anectine Curare	Ca. L. lung ¢ invasion myocardium Congestive heart failure. Arrhythmia Rt. bundle branch block, Ant. MI., diaphragmatic, indeterminate age. Left. thoracotomy.	3′	Myocardial infarct end of surgery	Death 16th po day
67	3	Cyclo	Closed Endotr.	Anectine	Ventral hernia. Chr. cholecystitis cholelithiasis. Post necrotic cirrhosis. Chr. bronchitis, emphysema. ASCVD ¢ hx. MI. Cholecystectomy. CD exploration.	3′	Myocardial infarct 1st po day	Death 1st po day
54	1	Cyclo	Closed Endotr.	Anectine	Renal cyst, benign, simple Decapsulation, rt. renal cyst	3′	Myocardial infarct 1st po day	Improved
77	3	Fluothane	S. Closed	— —	Recurrent L. ing. hernia. ASCVD angina pectoris. Status post MI L. inguinal hernioplasty	2′ 30″	Myocardial infarct operative day	Improved

Chart V(b) — Vascular complications within 7 day post anesthesia period.

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis Operation*	*Anes. time*	*Complication*	*Result*
77	2	Fluothane	S. Closed Endotr.	Anectine Curare	Squamous cell carcinoma bladder. ASCVD. Hypertension Segmental resection bladder.	3′ 25″	Myocardial infarct 2nd po day	Death 4th po day
72	3	Penthrane	Closed Endotr.	Anectine	BPH. Diabetes mellitus. ASCVD Post MI's 1962 & 1963 Suprapubic prostatectomy and diverticulectomy.	3′	Myocardial infarct 3rd po day	Death 3rd po day
58	3-4	Cyclo	Closed Endotr.	Anectine Curare	ASCVD - CHF. Chr. bronchitis Emphysema. Inactive duodenal ulcer. Hiatus hernia. Transthoracic hiatus hernia repair ¢ vagotomy & pyloroplasty.	4′ 35″	Myocardial infarct recovery room	Improved
59	3	Cyclo ether	Closed Endotr.	Anectine	Chr. cholecystitis, cholelithiasis ASCVD-MI undetermined age. Angina. Chr. bronchitis, emphysema. Duodenal ulcer. Cholecystectomy.	2′ 15″	Myocardial infarct recovery room	Death Recovery Room
64	1	Cyclo	Closed Endotr.	Anectine	Chr. cholecystitis, cholelithiasis choledocholithiasis. Hx. CV disease & aortic atherosclerosis. Cholecystectomy & CD exploration.	3′ 55″	Myocardial infarct 1st po day	Improved
80	2	Cyclo	Closed Endotr.	Anectine	Rt. indirect ing. hernia. BPH. Rt. inguinal hernioplasty	1′ 30″	Myocardial infarct 1st po day	Death 6th po day
66	2	Penthrane	Closed Endotr.	Anectine	Carcinoma cecum Right colectomy	3′ 20″	Myocardial infarct 6th po day	Improved

CHART V(b) — Vascular complications within 7 day post anesthesia period.

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis Operation*	*Anes. time*	*Complication*	*Result*
53	2	Cyclo ether	Closed Endotr.	Anectine	Lymphosarcoma large bowl Gastrojejunostomy	2′ 15″	Pneumonia, RLL 2nd po day	Improved
15	1	IVPent N20-02 Demerol	S. Closed	Anectine	Bi-malleolar fracture left ankle Open reduction of fracture and internal fixation.	3′	Aspiration pneumonia end of surgery	Improved
72	2	Cyclo	Closed Endotr.	Anectine	Cholecystitis, cholelithiasis Hx pneumonia 2 mos. previously Cholecystectomy	3′ 10″	Pneumonia, LLL 1st po day	Improved
30	1	Cyclo ether	Closed Endotr.	Anectine Curare	Chr. cholecystitis, cholelithiasis Cholecystectomy, CD exploration	3′ 55″	Atelectasis RLL ¢ infiltrate 1st po day	Improved
18	1	Spinal N20-02	S. Closed	Anectine	Torsion, rt. testicle Rt. orchiectomy & exploration. Fixation immobilization left testicle.	1′ 45	Aspiration pneumonia end of anesthesia. Pt. had full stomach	Improved
60	2-3	Ether	Open Endotr. S. Closed	Anectine	Ventral hernia. Asthma Repair ventral hernia	3′ 15″	Pneumonia, LLL 3rd po day	Improved
77	3	Penthrane	Closed	— —	Fracture right femur Rt. medial displacement osteotomy & Jewett nailing.	2′ 50″	Pneumonia, LLL 1st po day	Improved

Chart V(c) — Pulmonary complications within 4 day post anesthesia period.

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis* *Operation*	*Anes. time*	*Complication*	*Result*
15 mos.	1	Cyclo	Closed	——	Rt. inguinal hernia, hydrocele Repair hernia & hydrocele	1′ 35″	Pneumonia, LLL operative day (aspiration)	Improved
63	4	Cyclo ether	Closed Endotr.	Anectine	Perforation small bowel with peritonitis. Lymphosarcoma Resection of ileum.	2′ 30″	Pneumonia, bilat. rt. pleural effusion 2nd po day	Death 18th po day
10	1	Cyclo ether	Closed Endotr.	Anectine	Left renal cyst Decapsulation L. renal cyst	2′ 45″	Aspiration pneumonia 1st po day	Improved
64	3	Cyclo	Closed Endotr.	Anectine	Abdominal aortic aneurysm. Emphysema Exc. abdominal aortic aneurysm and graft.	5′ 5″	Pneumonia, bilat. 3rd po day.	Improved
76	3	Cyclo	Closed Endotr.	Anectine	ASHD - ECG - LAD ?MI ?age Abdominal aortic aneurysm Resection aortic aneurysm, graft	3′ 40″	Pneumonia, RLL 3rd po day	Improved
75	3E	Cyclo ether	Closed Endotr.	Anectine	Acute cholelithiasis, choledocholithiasis. ASCVD, chr. congestive heart failure. Cholecystectomy, CD exploration.	3′ 50″	Aspiration pneumonia day of surgery	Improved
68	2	Ether	S. Closed	Anectine	Metastatic Ca stomach, chr. cough Exp. lap., biopsy tumor stomach.	1′ 50″	Pneumonia, LLL 1st po day	Improved

CHART V(c) — Pulmonary complications within 4 day post anesthesia period.

ANESTHESIOLOGY CLASSIFICATION OF COMPLICATIONS

Age	*Physical Status*	*Agent*	*Technic*	*Relaxant*	*Diagnosis Operation*	*Anes. time*	*Complication*	*Result*
46	1	Cyclo ether	Closed Endotr.	Anectine	Chr. cholecystitis, cholelithiasis Cholecystectomy	2′ 35″	Pneumonia, LLL 5th po day	Improved
72	3	Ether	S. Closed Endotr.	Anectine	Chr. cholecystitis, cholelithiasis ASCVD. Pulmonary emphysema Cholecystectomy	2′ 40″	Pneumonia, RLL 1st po day	Improved
78	3	Ether	S. Closed Endotr.	Anectine Curare	Adenomyoma gallbladder. ASCVD Exogenous obesity. Fatty metamorphosis liver Cholecystectomy, exc. adenomyoma	1′ 45″	Pneumonia, bilat. 1st po day	Improved
52	2	Cyclo	Closed Endotr.	Anectine	Acute cholecystitis Cholecystectomy	3′	Pneumonia, RML, RLL 2nd po day	Improved
57	2	Cyclo	Closed Endotr.	Anectine Curare	Perforated gastric ulcer subtotal gastrectomy	3′ 20″	Pneumonia, RLL 1st po day	Improved
52	1	Fluothane	S. Closed Endotr.	Anectine	Chr. cholecystitis, cholelithiasis Cholecystectomy	1′ 35″	Pneumonia, RLL 1st po day	Improved
34	1	Cyclo Penthrane	Closed Endotr.	Anectine	Left adrenal cyst Removal L. adrenal tumor	3′ 5″	Atelectasis, RLL 2nd po day	Improved
30	2	Ether	S. Closed Endotr.	——	Cholelithiasis Cholecystectomy, appendectomy	2′ 47″	Pneumonia, LLL 3rd po day	Improved

Chart V(c) — Pulmonary complications within 4 day post anesthesia period.

CLOSING COMMENTS

This 1967 Annual Report outlines ten years of progress in this Department. The attainment of academic status in Cornell University Medical College elevated this Department among the academic departments of this country.

Our postgraduate training under Cornell University Medical College and its affiliated hospitals provides the postgraduate student with a well-rounded experience in all aspects of anesthesiology. The rotation of postgraduate students to all affiliated hospitals brings all anesthesiology departments of this center into closer relationship.

Respectfully submitted,

JOSEPH F. ARTUSIO, JR., M.D.

Professor of Anesthesiology, (Chairman)

Anesthesiologist-in-Chief

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